

## Literature Cited

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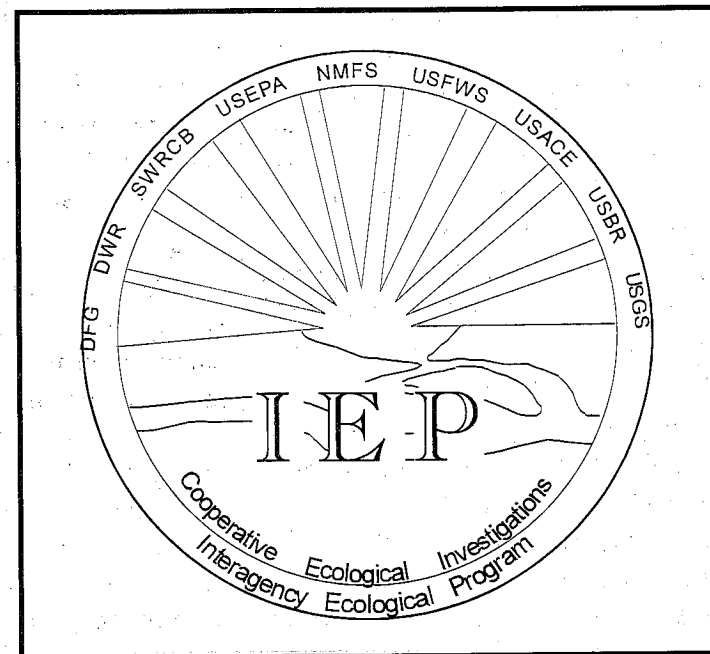
IESP. 1991. *1990 Annual Report*. Interagency Ecological Study Program for the Sacramento-San Joaquin Estuary. P.L. Herrgesell, Compiler. 123 pp.

Kohlhorst, D.W., D.E. Stevens, L.W. Miller. 1992. *A Model for Evaluating the Impacts of Freshwater Outflow and Export of Striped Bass in the Sacramento-San Joaquin Estuary*. (WRINT-DFG-Exhibit 3). Bay-Delta and Special Water Projects Division, Department of Fish and Game.

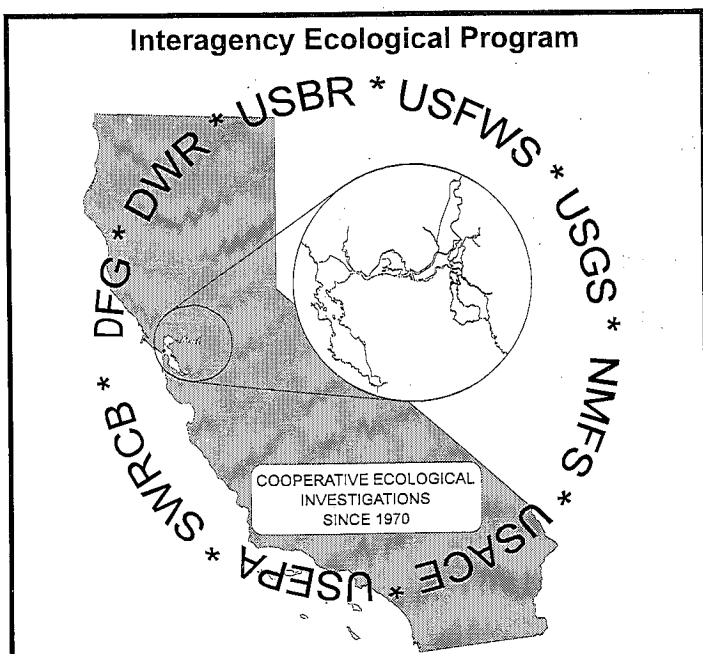
## Help Select a Logo

The Interagency Ecological Program is almost 30 years old and has no logo. In 1995, the Program Coordinators decided this major special study and monitoring collaboration should develop a logo for use on letterhead and for identifying Interagency Program products such as this *Newsletter* and our technical report series. Earlier this year, Interagency staff was invited to submit logo concepts for consideration. The Coordinators have reviewed several concepts and have narrowed the field to the three shown here. Now they want to know what you think. Contact Pat Coulston, Program Manager, to express your preference. You can even make suggestions for improving your favorite.

Pat can be reached at pcoulsto@delta.dfg.ca.gov or at 209/942-6068.



Logo B



Logo A



Logo C

## Publication of "San Francisco Bay: The Ecosystem"

James T. Hollibaugh

Alien invasions, droughts, floods, toxic pollution and water use conflicts — these were the headlines for San Francisco Bay in the 80s and 90s. Although eye-catching, they provided a very shallow perspective of the news of the bay during this period. The deeper story concerns dramatic advances in our understanding of the bay as an ecosystem during this period — an understanding both driven by and underscored by these headlines.

Almost 20 years ago, Dr. T.J. Conomos organized a symposium on San Francisco Bay for the XXth annual meeting of the Pacific Division of the American Association for the Advancement of Science. The product of that symposium, *San Francisco Bay: The Urbanized Estuary* (edited by Dr. Conomos and published in 1979 by the Pacific Division AAAS), was the first comprehensive collection of papers on San Francisco Bay. This immensely popular volume — I was unable to find one at any price when I moved back to the Bay Area in 1983 and have been forced to rely on borrowing from a colleague a copy that has since disappeared (NOT to my personal library) — rapidly became the "bible" of research scientists, consultants, environmental lawyers, managers, and others concerned with San Francisco Bay. Although the collection was updated in a 1985 issue of *Hydrobiologia* that focused on a detailed study of the bay conducted in 1980 (Cloern, J.E., and F.H. Nichols, editors. "Temporal dynamics of an estuary: San Francisco Bay"), *The Urbanized Estuary* remains a primary reference on San Francisco Bay.

On both political and scientific fronts, the nearly two decades between publication of *The Urbanized Estuary* and

the present have hosted a number of significant events. A series of hearings to determine, among other things, water allocations to protect bay aquatic resources focused the attention of managers and the general public alike on the bay during the latter half of the 1980s. Attention was sharpened by what appeared to be an unending series of drought years, possibly attributable to broad-scale climate change brought on by anthropogenic carbon dioxide emissions. These fears were erased, at least temporarily, by torrential storms and record floods during the winters of 1993 and 1995.

At the height of the drought an exotic species, the Asiatic clam *Potamocorbula amurensis*, was introduced to northern San Francisco Bay. Unlike many of its predecessors, establishment of this organism had devastating consequences for the bay. In slightly more than a year following its introduction in 1986, it became established throughout the bay. Its populations became so large in some areas, notably Suisun Bay, that standing crops of phytoplankton were decimated and primary production plummeted to about 20 percent of its previous value. In addition to competing directly with zooplankton for what appeared to be limited phytoplankton food resources, the clam impacted zooplankton populations directly by capturing juvenile stages of some species. Because these zooplankton were key food items for the larvae of some fish species, this posed the prospect of a cascading series of indirect negative impacts on the already beleaguered fish populations of the bay.

This series of events spurred new research and analysis of historical data focused on elucidating the rela-

tionship between freshwater inflows and ecological processes in San Francisco Bay and on understanding the bay as an ecosystem. This scrutiny raised many questions about our conceptual models of how the bay functions as an ecosystem. What are the sources of organic matter fueling bay productivity? What is the relationship between estuarine physics and biology or chemistry? What are the links between the bay and the Sacramento and San Joaquin rivers and their delta? How important is freshwater flow versus freshwater quality? How does the bay function physically, and what controls exchange with the ocean or circulation in the northern reach? Such scrutiny also focused more process-oriented research on the North Bay, where environmental research previously had been dominated by mandated monitoring programs.

Given the determined efforts to understand San Francisco Bay in the nearly two decades since the symposium on which *The Urbanized Estuary* was based, it seemed appropriate to consider organizing a similar symposium with the intent of producing a companion volume to update *The Urbanized Estuary* and present the emerging new paradigms. The 75th Annual Meeting of the Pacific Division, AAAS, held in San Francisco in 1994, provided the opportunity and Drs. T.J. Conomos and R.I. Bowman provided the encouragement and moral support needed to overcome my trepidation about the magnitude of the project. The result is this volume, which complements *The Urbanized Estuary*.

*San Francisco Bay: The Ecosystem*, edited by James T. Hollibaugh and published by the Pacific Division, American Association for the Ad-